





*Environment topics at a glance*

## The protection of water quality in bored and dug wells

*People who rely on bored and dug wells for their water can achieve acceptable water quality by maintaining or upgrading their wells.*

Improper well construction and failure to carry out routine preventive maintenance on wells often results in contamination of a well supply and the subsequent creation of a hazard to both public health and safety. Because bored and dug wells are particularly susceptible to deterioration of their sanitary integrity, maintenance on these types of wells is especially important. Drilled wells, because of differing technology, are discussed in a separate fact sheet.

Ontario Regulation 903, section 20, pertaining to water well construction in Ontario, states that, "the well owner shall maintain the well at all times after the completion date in a manner sufficient to prevent the entry into the well of surface water or other foreign materials."

The purpose of this information sheet is to assist people who rely on bored or dug wells as a source of drinking water to safeguard the quality of their water by maintaining or upgrading their wells. While in some instances the upgrading work can be done by the owner, employing a competent well contractor is advisable.

### Well regulations

Ontario Regulation 903 under the Ontario Water Resources Act provides for the licensing of water well contractors and well technicians by the Ministry of the Environment. This regulation prescribes the minimum construction standards that all contractors, including private homeowners, must adhere to in the construction of all wells. The attached figures illustrate the minimum sealing requirements of Ontario Regulation 903 for bored and dug wells.

### Factors contributing to the deterioration of well water quality

A poorly maintained or constructed well can result in the bacterial and/or chemical contamination of well water. The most common cause

of these quality problems is foreign materials or poor-quality surface waters in the immediate vicinity of a well having direct access into the well. Bored wells in Ontario are usually constructed by a bucket or auger-type rotary machine, whose boring operations produce holes of 76 centimetres or more in diameter, and which are usually cased or lined with a concrete pipe having an inside diameter of 60 centimetres or more. Large diameter wells are also constructed with other types of equipment, such as backhoes. Good sealing around the casing or liner in these types of wells is hard to achieve and maintain because of the potential for settlement of both seal and casing.

Indicators that the well sealing is inadequate and that surface contamination is gaining access to the well include:

- the presence of coliform bacteria in counts exceeding recommended limits set by health authorities
- changes in the quality of the water such as turbidity, colour, taste, or odour, especially after a rainstorm or snow melt
- rapid or large changes in the water level in the well, especially after a rainstorm or snow melt
- cascading or seeping of water and/or staining along casing above the water level in the well
- the presence of biological material such as animals or roots in the well
- the presence of unsealed or parted joints or cracks in the casing well or cover
- the settlement of the ground surface around the top of the well
- the presence of roof drainage pipes in the well
- the absence of a watertight cover set at an appropriate height above the ground surface

- changes in the chemical quality of the well water as detected through laboratory analysis.

## Preventive maintenance measures

There are some measures that can be taken in the care and maintenance of a well that the homeowner should be aware of, which will help to provide good-quality water. These measures include:

### 1) Well location

To safeguard a well supply from contamination, no activity that could result in the well's contamination should be performed within the area of a well. It is advisable that refuse, manure, petroleum products, salt, fertilizers, pesticides or any other potential contaminants not be stored, used or disposed of in the vicinity of the well. When mixing pesticides, the water supply line from the pressure system should be equipped with a backflow prevention device.

### 2) Well construction

- The well casing must be securely in place and watertight. If damaged or cracked, it must be replaced immediately since it will give contaminants direct access to the well.
- The well casing cap should be a minimum of 30 centimetres above ground surface and should not be cut off and buried
- No unsealed openings should exist in the wall or along the joints of cement-tile casing above the water level in the well. If any are found they should be made watertight with an appropriate durable sealing material applied preferably from the outside of the casing. Subsidence, corrosion or other damage can occur and will allow surface waters or shallow seepage waters to enter directly into the well.
- The circular space outside the outer casing should be filled with a suitable sealant, such as Portland cement grout, concrete, bentonite or equivalent commercial slurry or clay slurry to prevent surface water runoff from seeping directly into the well around the casing. Where settlement of the sealant has occurred, the area around the casing should be excavated and backfilled with a well-compacted, suitable grouting or sealing material.

- If the general land surface around the well is depressed or susceptible to flooding, it should be raised and regraded so that it slopes away from the well. The land surface around and immediately beside the well casing should be at least 15 centimetres above ground level.
- If the well casing has settled, it may be necessary to extend the well casing and regrade the general land surface away from the well.
- The well water's surface should be inspected, and any debris found floating in the surface of the water removed from the well.
- The connections at the well casing for pump and electrical lines should be made watertight and properly sealed. The casing may have to be excavated to replace the seal if it has failed
- All wells that have been repaired should be chlorinated and tested for potability immediately after the work has been completed.
- All abandoned wells must be sealed in accordance with Ontario Regulation 903.

## Additional information sources

There are some additional publications you may wish to read. You can obtain a copy of the *Regulation 903* itself. The Ministry of the Environment also has factsheets titled

- *The protection of water quality in drilled wells*
- *Important facts about well construction*
- *Recommended methods of plugging abandoned water wells*

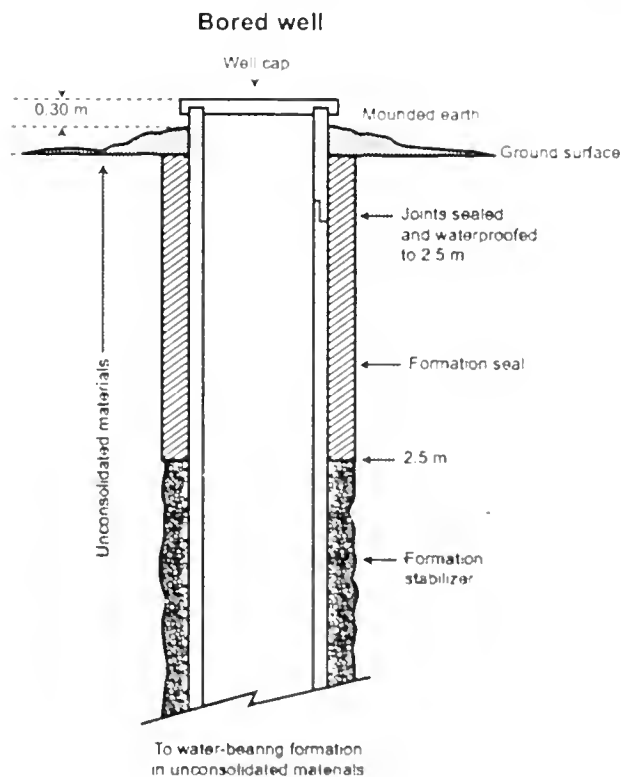
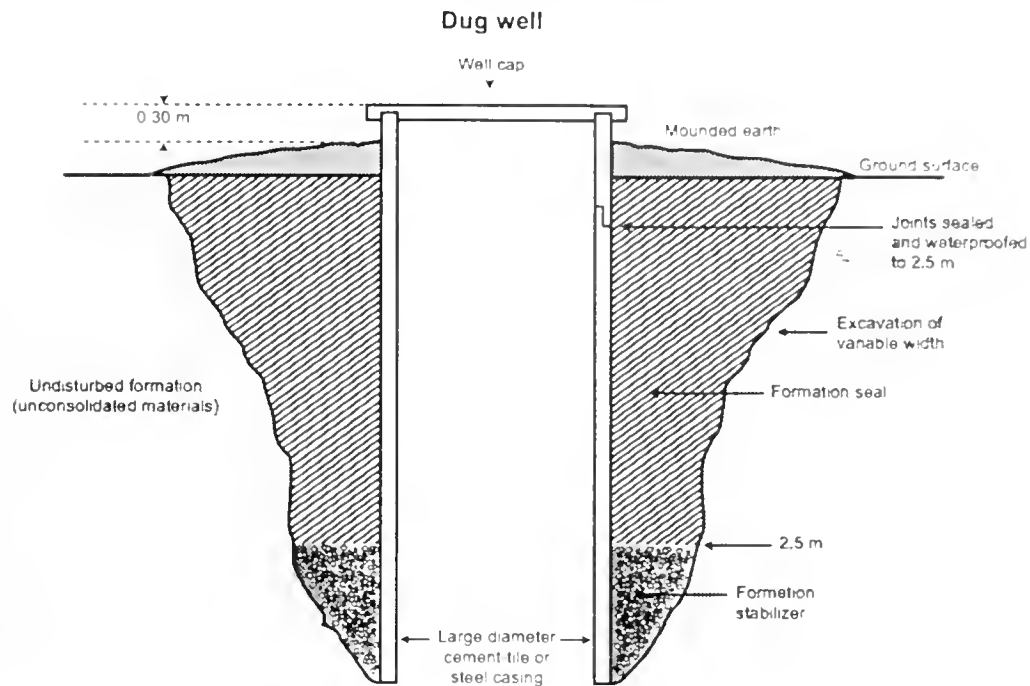
For further information about wells contact your nearest Ministry of the Environment office as listed in the blue pages of your telephone directory

Or call the ministry's public information centre at 1-800-565-4923

In Toronto call 416-325-4000

The ministry's Web site is at [www.ene.gov.on.ca](http://www.ene.gov.on.ca)

## Dug, bored wells and their sealing requirements



**Formation seal**

Can be composed of portland cement grout, concrete, bentonite, equivalent commercial, or clay slurry, well cuttings or overburden materials. For details on selection and placement, see O. Reg. 903.



**Formation stabilizer**

Can be composed of clean washed sand or gravel, clean overburden materials or cuttings.

### NOTE

all dimensions are minimum construction standards





